

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all previous listings of claims:

1. (Currently amended) An apparatus for measuring an attribute of ozone, the apparatus comprising:

a vessel to contain an ozonated fluid for delivery to a semiconductor process tool, the vessel including a plurality of reflection sites;

a light source configured to direct a first band of light and a second band of light along a substantially shared path through the ozonated fluid in the vessel, the first and second bands of light diffusely scattered by the plurality of reflection sites vessel, wherein ozone in the ozonated fluid has a greater absorption associated with the first band of light than with the second band of light; and

a photosensor that senses the first band of light and the second band of light passing along the substantially shared path for measuring an attribute of the ozone in the ozonated fluid.

2. (Cancelled)

3. (Previously presented) The apparatus of claim 1, wherein the vessel comprises a delivery pipeline for the ozonated fluid to permit in situ measurement of the ozone.

4. (Currently amended) The apparatus of claim 1, wherein the first band of light is associated with a yellow-red frequency and a first width, and the second band of light is associated with a blue frequency and a second width.

5. (Original) The apparatus of claim 4, wherein the light source comprises a yellow-red light-emitting diode to provide the first band of light, and a blue light-emitting diode to provide the second band of light.

6. (Original) The apparatus of claim 5, further comprising a second photosensor that senses the first band of light and the second band of light after they pass along at most a portion of the substantially shared path to detect differential aging of the light-emitting diodes.

7. (Currently amended) The apparatus of claim 1, wherein the substantially shared path is defined in part by the plurality of reflection sites at least one reflection site to increase a length of the path through the ozonated fluid in the vessel, thereby increasing a measurement sensitivity for the attribute of the ozone in the ozonated fluid.

8. (Currently amended) The apparatus of ~~claim 7~~ claim 1, wherein the vessel comprises a material that defines an inner surface of the vessel for diffusely scattering the first and second bands of light at the plurality of reflection sites ~~at least one reflection site~~.
9. (Currently amended) The apparatus of ~~claim 7~~ claim 1, further comprising a coating on an exterior surface of the vessel for diffusely scattering the first and second bands of light at the plurality of reflection sites ~~at least one reflection site~~.
10. (Previously presented) The apparatus of claim 1, wherein the attribute of the ozone in the ozonated fluid has an absorption band that overlaps the first band of light.
11. (Original) The apparatus of claim 1, wherein the light source comprises a light-emitting diode.
12. (Original) The apparatus of claim 1, wherein the vessel comprises a material selected from the group of quartz and a polymer.
13. (Original) The apparatus of claim 1, wherein the photosensor senses the first band of light and the second band of light after the first band of light and the second band of light pass along the substantially shared path.
14. (Currently amended) The apparatus of claim 1, wherein the photosensor senses the first band of light and the second band of light as the first band of light and the second band of light pass along a portion of the substantially shared path.
15. (Previously presented) The apparatus of claim 1, further comprising at least one of a temperature sensor, for measuring a temperature of the ozonated fluid in the vessel, and a pressure sensor, for measuring a pressure of the ozonated fluid in the vessel.
16. (Currently amended) An ozonated water generator, comprising:
 - a contactor for mixing water and ozone gas;
 - a pipeline in fluid communication with the contactor for delivery of ozonated water to a semiconductor process tool, the pipeline including a plurality of reflection sites;
 - a light source configured to direct a first band of light and a second band of light along a substantially shared path though the fluid in the pipeline, the first and second bands of light diffusely scattered at the plurality of reflection sites in the pipeline, wherein ozone in the ozonated water has a greater absorption associated with the first band of light than with the second band of light; and

a photosensor that senses the first band of light and the second band of light after they pass along the substantially shared path for measuring an attribute of the ozone in the ozonated fluid.

17. (Currently amended) A method for measuring an attribute of ozone in an ozonated fluid, the method comprising:

selecting a first band of light for which ozone has a greater absorption than for a second band of light;

directing the first and second bands of light thru the vessel to diffusely scatter the first and second bands of light at a plurality of reflection sites of the vessel;

sensing the first band of light and the second band of light after they pass along a substantially shared path through the ozonated fluid; and

modifying a measured attribute of the ozone in the ozonated fluid determined from the sensed first band of light in response to the sensed second band of light to improve the accuracy of the measured attribute.

18. (Previously presented) The method of claim 17, wherein modifying comprises correcting the measured attribute for an intensity loss of the sensed first band of light associated with at least one factor other than absorption by the attribute of the ozone in the ozonated fluid.

19. (Previously presented) The method of claim 18, wherein the at least one factor comprises at least one of bubbles, a reflectivity of a reflection site of the substantially shared path, an impurity in the ozonated fluid, and a mechanical dimension of a vessel containing the ozonated fluid.

20. (Currently amended) The method of claim 17, further comprising providing the substantially shared path in a vessel defined at least in part by the first and second bands of light being diffusely reflected at the plurality of reflection sites.

21. (Currently amended) The method of claim 20, wherein the ~~substantially shared path is defined in part by at least one~~ plurality of reflection site to sites increase a length of the substantially shared path in the vessel.

22. (Currently amended) The method of claim 20, further comprising causing the ozonated water to flow through the vessel from an ozonated water generator to a semiconductor process tool to permit in situ measurement of the ozone concentration.

23. (Original) The method of claim 17, further comprising alternately directing the first band of light and the second band of light along the substantially shared path, wherein sensing comprises alternately sensing the first band of light and the second band of light.
24. (Original) The method of claim 22, wherein alternately directing further comprises alternately directing no light along the substantially shared path.
25. (Currently amended) The method of claim 22, ~~wherein~~ further comprising sensing at least one of the first band of light and the second band of light along after the first and second bands of light have passed at most a portion of the substantially shared path, and responsively maintaining an emitted intensity of at least one of the first band of light and the second band of light.
26. (Currently amended) A method for producing ozonated water having a desired ozone concentration, the method comprising:
- selecting a first band of light for which the ozone has a greater absorption than for a second band of light;
 - generating ozonated water in a ozonated water generation device;
 - sensing the first band of light and the second band of light after the first and second bands of light are diffusely scattered at a plurality of reflection sites and pass along a substantially shared path defined in part by diffuse scattering at the plurality of reflection sites through the ozonated water after the ozonated water flows from the device;
 - modifying a measured ozone concentration determined from the sensed first band of light in response to the sensed second band of light to improve the accuracy of the measured ozone concentration; and
 - adjusting at least one parameter of the device until the measured ozone concentration substantially matches the desired ozone concentration.
27. (Previously presented) The apparatus of claim 1 wherein the attribute is ozone concentration.
28. (Previously presented) The apparatus of claim 1 wherein the attribute is absorption of the first or second bands of light by the ozone.

29. (Currently amended) The apparatus of claim 1, wherein the plurality of reflection sites affects vessel ~~defines two or more reflection sites for affecting~~ an amount of diffuse scattering of the first or second bands of light.
30. (Previously presented) The apparatus of claim 1, wherein the photosensor is positioned along the substantially shared path for sensing the first and second bands of light as the first and second bands of light pass through the vessel.
31. (Currently amended) The apparatus of claim 1, further comprising a second photosensor positioned along a longitudinal axis defined by an external surface of the vessel for sensing the first band of light and the second band of light passing along the substantially shared path prior to the first and second bands of light reaching the photosensor.
32. (Previously presented) The apparatus of claim 1, wherein an interior surface of the vessel or an exterior surface of the vessel comprises a material to facilitate diffuse scattering of the first or second bands of light.
33. (Previously presented) The apparatus of claim 32, wherein the material is a coating.
34. (Previously presented) The apparatus of claim 1, wherein the first and second bands of light are in the visible spectrum.
35. (Cancelled)
36. (Currently amended) The apparatus of claim 1, wherein the ~~vessel further comprises one or more~~ plurality of reflection sites ~~[[that]]~~ facilitates a diffuse reflection by the first and second bands of light within the vessel.
37. (Currently amended) An apparatus for measuring an attribute of an ozonated fluid, the apparatus comprising:
- a vessel to contain the ozonated fluid, the vessel defining a first end, a second end, a plurality of reflection sites, an interior surface, and an exterior surface, the interior surface and the exterior surface extending from the first end to the second end;
- a light source to direct a first band of light and a second band of light along a substantially shared path through the vessel defined in part by the plurality of reflection sites, wherein ozone in the ozonated fluid has a greater absorption associated with the first band of light than with the second band of light and the interior surface or the exterior

surface facilitates diffuse scattering of the first and second bands of light at the plurality of reflection sites and;

a photosensor positioned relative to the interior surface or exterior surface of the vessel for sensing the first and second bands of light passing along the substantially shared path to measure the attribute of the ozonated fluid.

38. (New) The apparatus of claim 37, wherein the plurality of reflection sites increases a length of the substantially shared path relative to a length of the interior surface or exterior surface of the vessel.